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Contact: Vicky Krikelas
(206) 860-3263

John Ferguson
(206) 860-3270

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COLUMBIA RIVER SALMON TAG DETECTED IN NEW ZEALAND

Northwest fisheries scientists join global effort to trace tag's amazing journey

A tiny electronic tag from a steelhead in the Columbia River ecosystem was recently discovered in southern New Zealand, almost two years later and 7,700 miles away. The tag was recovered from the stomach of a muttonbird, known locally as the "titi" and formally as the sooty shearwater (*Puffinus griseus*), harvested by indigenous Rakiura Maori people. This discovery has sparked a trail of intrigue and scientific enquiry spanning the Pacific.

The PIT (Passive Integrated Transponder) tag was originally placed in a juvenile steelhead (*Oncorhynchus mykiss*) at the Ringold Hatchery in central Washington in September 2004 and released into the Columbia River by mid April 2005. The steelhead was one of almost 100,000 tagged fish used in a study conducted by NOAA Fisheries' Northwest Fisheries Science Center (NWFSC) to investigate the survival of juvenile salmon as they migrate downstream through the Columbia River hydropower system. The fish itself was tagged by the U.S. Army Corps of Engineers, the entity responsible for managing eight Federal dams on the Columbia and Snake Rivers.

The PIT tag in the steelhead was last detected in May 2005 while passing through a juvenile fish bypass system at Bonneville Dam (river kilometer 235). The sooty shearwater chick was harvested in New Zealand in late April 2007. This leaves almost a two-year gap and approximately 7,700 mile (12,400 km) distance between when the tag was last detected in the fish and when it turned up inside the harvested chick. What happened to the tag in the interim has got everyone scratching their heads.

The tag was given to the University of Otago's *Kia Mau Te Titi Mo Ake Tonu Atu* ("keep the titi forever") Research Team in Dunedin, New Zealand, who together with NOAA Fisheries scientists uncovered some fascinating details of the amazing and potentially record-breaking journey this tag has taken – revealing some new biological insights and posing plenty of new questions along the way.

The fact that a sooty shearwater preyed upon a juvenile steelhead from the Columbia River came as no surprise to Dr. Jen Zamon of the NWFSC.

"All stocks of Columbia River salmon exiting the river mouth must pass through Columbia River plume, a transitional habitat between river and ocean waters," according to Dr. Zamon.

Research sponsored by the Bonneville Power Administration and conducted by NOAA Fisheries' scientific teams has focused on potential salmon predators in this habitat since 2003. Dr. Zamon and her colleagues have documented tens of thousands of birds actively feeding in the plume during the May through September salmon smolt outmigration each year. The most numerous fish-eating birds in those months are the sooty shearwater as well as the common murre.

“The sooty shearwater breeds in the southern hemisphere (primarily Chile and New Zealand) and migrates to the coast of Oregon and Washington for its non-breeding season. It is the most common seabird found in the coastal ecosystem known as the California Current. Diet work in other areas shows that it consumes fishes (e.g. anchovy) as well as krill, and shearwaters can dive to depths of 30 meters in pursuit of prey,” says Dr. Zamon.

According to John Ferguson, director of the NWFSC’s Fish Ecology Division, the PIT tag observation points to the interconnectedness of aquatic ecosystems at a global scale.

“We’ve known for a long time that actions taken in the Columbia River to improve the survival of juvenile salmon migrating downstream during the spring and summer are linked to conditions fish experience when entering the plume and the Pacific Ocean. What we didn’t fully grasp until this point was how the sooty shearwaters connect ecosystems in the northern hemisphere to those in the southern reaches of the Pacific Ocean,” Ferguson said.

“The most likely scenario is that the young salmon was caught and consumed by an adult sooty shearwater at the mouth of the Columbia River some time in the summer of 2005. The tag then remained in the bird’s stomach for over 16 months until it was regurgitated to feed young chicks early in 2007.”

Since very little is known about their feeding habits in the plume area, preparations are currently underway by NOAA Fisheries scientists to examine shearwater and murre diets and behavior in 2008. The study will track bird movements near the river mouth and determine what stocks of salmon are found in the diet of shearwaters and murre.

In New Zealand shearwater chicks are harvested by native Maori, and their harvest is managed as a traditional food resource in that country. When contacted about this incredible find, Jane Davis, secretary of the Rakiura Titi Islands Administering Body (one of the two committees that manage the harvest on the Titi Islands and who directs the Titi Research Program) and an elder in the harvesting community, was delighted, pointing out that there was “a real interest from within the community in expanding their knowledge about the birds,” and that this find highlighted how the bird’s influence spread right around the Pacific.

NOAA scientists will be following up on this observation and working with colleagues in New Zealand to see if additional PIT tags from the Columbia River have been deposited on sooty shearwater nesting sites.

The NWFSC conducts research to help conserve and manage living marine resources and their ecosystems in the Northeast Pacific Ocean. The center’s research assists resource managers in making sound decisions that build sustainable fisheries, recover endangered and threatened species, sustain healthy ecosystems and reduce human health risks.

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